CONTROL OF INDIRECT FINANCIAL SUBSIDIES IN CANADA'S BUDGET: DIAGNOSIS AND RECOMMENDATIONS

Carliss Baldwin
Donald Lessard
Scott Mason*

WP 1302-82 April 1982

November 1981
Revised April 1982

*The authors are respectively Associate Professor, Harvard Business School; Associate Professor, M.I.T. Sloan School of Management; and Assistant Professor, Harvard Business School. This paper is based on a report submitted to the Department of Finance, Government of Canada. We are indebted to Donald Tate for defining the scope of the topic and for probiing questions and comments which have sharpened our analysis considerably, to Iain Henderson for an in-depth review of the treatment of various financial incentives within the current system, and to numerous officials of various ministries and agencies of the Canadian Government for frank and insightful comments on the strengths and weaknesses of various suggestions. The views expressed are ours, however, and do not reflect the position of the Department of Finance or of our respective institutions.

1. INTRODUCTION

Governments use financial incentives to induce private firms to undertake socially desirable investments which are not privately feasible. Examples of such investments are projects which create jobs in thin labor markets as well as projects which preserve jobs by assisting distressed corporations such as Massey Ferguson or Chrysler. Financial incentives include cash grants, guarantees, concessionary loans, direct investment, and tax preferences such as tax holidays, tax credits, or special depreciation allowances.

Most financial incentives, including tax preferences, commit the government to future outlays. The outlays are often not specified in advance and may depend on a variety of unknowns. As a result, such incentives frequently bypass the budget process which typically is designed to control current cash outlays. Failure to control financial incentives within the budget is a serious problem for two reasons. First, budgetary controls impose a discipline which motivates careful evaluation of individual projects and programs. Programs not subject to budgetary oversight are likely not to be as carefully evaluated. Second, the budget limits total expenditures to a level consistent with tax and borrowing policy. When off-budget items like loan guarantees cause large unplanned expenditures, the effectiveness of macroeconomic policies may be seriously impaired.

In Canada, budgetary control has already been extended to tax-based incentives through the Federal Tax Expenditure Budget. Further, loans and equity investments are treated as recoverable cash outlays and hence also

are controlled to an extent. However, guarantees are not reflected in the budget unless and until they result in cash outlays. These differences in treatment of alternative types of outlays distort the budgetary process, since in order to have effective control and planning at all levels of government consistent cost measures must be employed. A similar problem exists in the United States and many other industrialized countries. As Alice M. Rivlin, Director of the U.S. Congressional Budget Office notes:

> "increases in the aggregate level of resources being allocated by the federal government through loans and guarantees...have occurred without any explicit decision by the Congress that they should occur."[1]

In the past the difficulty of incorporating guarantees and other contingent future subsidies in the budget has been in determining a comparable measure of their cost. However, recent advances in financial economics now provide the basis for computing cash grant-equivalents of highly complex contracts including most guarantees. The cash grant-equivalent is the cash amount that the recipient would willingly accept in place of the contingent, future subsidy. We will argue it is the relevant measure of a subsidy for budgetary accounting purposes.[2]

This paper first describes current methods of accounting for guarantees and other financial interventions within the Canadian federal budget. It then discusses the problems of misapplication and misallocation that may be fostered under the current system. The paper goes on to recommend changes

---

1 Hearings before the Task Force on the Budget, House of Representatives, Ninety-Sixth Congress, First Session, November 13, 1979.

2 The term-grant equivalent or cash grant equivalent is used in the development literature to connote the proportion of foreign aid that represents a true transfer.

that would put guarantees and other indirect subsidies on a comparable footing with direct federal support. Specifically, we recommend that cash grant equivalents of indirect subsidies be computed and that ceilings on such subsidies be incorporated into the budgetary targets. Integrating financial subsidies into the budget in this way, we argue, both is feasible and would provide benefits in the form of more consistent resource allocation, and more accurate planning than the current system affords.

2. ACCOUNTING FOR FINANCIAL INCENTIVES: THE CURRENT SYSTEM

The government of Canada operates on a cash appropriations budget. However, it employs a five-year Policy and Expenditure Management System which includes the current fiscal year, the upcoming fiscal year for which the main estimates are prepared, and three planning years. The expenditure plan is broken down into ten "resource envelopes" which reflect the broad functions of government and cut across departmental and agency lines. The principal resource envelopes are Economic Development, Energy, Social Affairs, and Defence.[3]

Each envelope is divided into an "A-base" of ongoing projects and a Policy Reserve of "B-base" to fund new initiatives. When a new project or program is proposed it is first scrutinized by the envelope policy committee. If approved, its initial funding is charged against the envelope's Policy Reserve. Funding in subsequent years is incorporated into the A-base.

---

[3] See Canada Treasury Board [1980] or Canada Department of Finance [1981] for descriptions of the Policy and Expenditure Management System.

Envelope ceilings are set every year and the Policy Reserve or B-base is defined as the difference between the A-base budget and the ceiling. In principle, once the ceiling is set, the Policy Reserve can only be expanded by shrinking the A-base, that is by cutting back on some existing program. Thus the scale of new programs is limited to the Policy Reserve plus whatever can be saved out of the A-base. The envelope ceiling thus effectively limits the total size of new initiatives within each envelope. However, actual decisions on which projects are funded and which are deferred are made by ministers acting as a group through the envelope committee.

The primary purpose of the envelope system is to force policymakers to consider the opportunity cost of choices they make within the constraints imposed by overall fiscal policy as reflected in the envelope ceilings. The envelopes are a pragmatic mechanism which lead decisionmakers to make the types of tradeoffs idealized in social cost-benefit analysis. Inevitably, the tradeoffs are affected by the way in which various types of interventions are reflected in the budget and hence charged against the envelopes.

In general, the government may subsidize an activity in a variety of ways: for example it may provide a cash grant, a tax reduction or an indirect financial subsidy such as a concessionary loan, a guarantee or equity capital.[4] However, the envelope budget reflects only the direct cash outlay or tax expenditure associated with any intervention. Table 1 summarizes how a

---

4 Equity capital on which the government expects to earn less than a fair market rate of return contains an implicit subsidy.

Table 1

Budgetary Treatment of Alternative Financial Interventions

Intervention	Subsidy Grant-Equivalent	Charge against Current Envelope	Future Charge or Gain to Envelope
Taxable One-Time Cash Grant 46% Tax Rate	$100	$187	-
Non-Taxable One-Time Cash Grant	100	100	-
Investment Tax Credit*	100	100	-
One Year Loan			
$1000 Principal 10% Interest Concession** 0% Probability of Default	100	1000	$1000 - gain on repayment
One Year Loan			
$900 Principal 10% Interest 10% Probability of Default	100	900	$ 900 - gain on repayment***
One Year Guarantee			
$1000 Principal 10% Probability of Default	100	0	$1000 - charge on default****

* Tax expenditures are charged to the envelopes via reductions in the direct expenditure limits. See Canada Treasury Board [1980] p. 16.

** The 10% interest concession is stated in terms of net present value. For example, with a 10-year balloon loan (annual payments of interest only) and a market interest rate of 16%, a 13.9% rate represents a 10% concession, e.g., the present value of a concessional loan at 13.9% is 90% of its present value.

*** Actual amount uncertain

**** Amount and timing uncertain

variety of interventions with the same grant-equivalent would be charged against an envelope under the current system. The calculations are purely illustrative and designed to show how the current budgetary system works: calculations for any actual intervention would be more complicated might and yield different results.

Table 1 shows that interventions with the same real impact are not treated consistently within the budget. For example, taxable cash grants are accounted for on a gross of tax basis: the envelope does not benefit from taxes recouped on a cash grant to a tax-paying corporation. This is a relatively minor budgetary distortion.

An apparently larger distortion arises in the treatment of loans. When a loan is made, the full face amount of the loan is deducted from the envelope: the envelope recoups the face amount of the loan if it is repaid. Nevertheless, unless the probability of default on a loan is close to 100%, the initial charge to the envelope will be substantially higher than the real impact or subsidy transmitted by the intervention. Thus, within the envelope, loans are a relatively inefficient use of budgetary resources. In fact, they are very seldom used. Subsidized lending by the government is for the most part carried out by organizations such as the Export Development Corporation (EDP) and the Federal Business Development Bank (FBDB) which have been set up as lending institutions. These bank like agencies are separately capitalized and their revenues and costs netted out in the appropriations budget. Since loans require servicing and monitoring, the restriction of lending activities to specialized institutions within the government seems reasonable. The lending authority of these institutions is

determined by statute and is not directly affected by the envelope ceilings. For this reason, the budgeting for loans within the envelopes, although highly distortive in theory, probably causes few problems in practice.

Finally, guarantees are not charged against an envelope in the year they are granted. Instead, the envelope is held liable if a payment is required in subsequent years. For example, in 1981, the economic envelope committee approved a ten-year guarantee of newly issued Massey-Ferguson preferred stock. The guarantee did not affect the envelope in 1981. However, if Massey-Ferguson defaults on its preferred stock, in theory up to $130 million (the face amount of the guarantee) would be charged against the economic envelope's Policy Reserve in the year of default.

The policy of charging for guarantees on the basis of cash payments required may be appropriate for programs which guarantee large numbers of small transactions. With a large number of small and independent risks, the percentage of defaults in any given year is predictable and can be accounted for as a budgeted expense within a standard accounting framework. Thus, if student loan guarantees have a default rate of five percent,then five percent of the increase in loans outstanding can be appropriated each year to pay for the student loan guarantee program. Although at the beginning of the year it is not known which loans will default, the large number of such loans usually ensures that actual outflows correspond closely to budgeted outflows.

The "pay as you go" policy implicitly separates the decision to grant the guarantee from the consequences of the decision. With an ongoing program this is usally not a serious problem, because deviations of actual from expected losses will be small in any given accounting period. However, the "pay as you go" system is not appropriate for large, special-purpose guarantees such as Massey-Ferguson. First, with a large, unique risk it is impossible to budget for "average" default experience and expect actual payments to be close to the budgeted amounts in any given year. Second, in a case of a default, the incremental expenditure is likely to be large relative to any individual budget. This creates problems for the enforcement of budgetary ceilings after the default occurs. As an illustration of these problems, the Economic Envelope Policy Reserve for new projects amounts to approximately $300 to $350 million per year. Under the current system, a Massey-Ferguson default would result in a charge of $130 million against the Policy Reserve. A number of responses to such a large loss are possible. First, the Massey default might displace $130 million of new economic initiatives, or might force an equivalent shrinking of existing programs (the A-base). In either case the envelope would function as designed. On the other hand, to mitigate the impact of the default, the envelope ceiling might be relaxed. A relaxation of the ceiling is a reasonable response to a large disruptive shock, and thus would be justified at the time default occurred.

Thus the "pay as you go" budgetary treatment of large guarantees results in a "damned if you do, damned if you don't" situation. If losses are extracted from the envelope, the envelope's planning function is severely distorted since expenditure limits will be subject to large random shocks.

On the other hand, if it is generally understood that large guarantee losses will not be charged to the envelope, guarantees become a free good and escape budgetary discipline altogether.

We have shown that financial interventions, particularly guarantees, are not controlled or consistently accounted for within the current budgetary system. But why are control and consistent accounting for financial incentives desirable? In Section 3 below, we argue that all financial incentives transmit quantifiable subsidies to the recipient firms: these subsidize channels, if not controlled, will be misused. To prevent misallocations, a system for evaluating indirect subsidies within a broader public resource allocation framework is necessary: this topic is addressed in Section 4.

3. THE CONTROL OF INDIRECT SUBSIDIES

Indirect financial subsidies arise when a private individual or firm gets capital at less than the fair market cost. For example, the government may lend money to a corporation at a zero or below-market rate, or it may invest in equity (purchase shares) without requiring a fair rate of return. As an alternative, it may guarantee the debt or equity of the same corporation; with the government's credit behind it, the company will be able to raise capital on more advantageous terms than would have been possible without the guarantee.

Whenever the government gives a firm access to capital on favorable terms, it transmits a subsidy to that firm. In the case of a direct loan

or equity, the subsidy is proportional to the difference between the rate of return required by the government and the fair rate of return on an equivalent investment in the capital market. Thus, if the government expects no return from a Crown corporation investment, the subsidy is equal to the total investment (the capital of the Crown corporation). If the government expects or requires capital to be returned after a number of years, the subsidy is proportional to the amount that the funds would be expected to earn if invested commercially in the intervening years. Only if the government lends or invests money expecting to earn the market rate or return is no subsidy transmitted by the transaction.

Guarantees are more complicated than direct loans or equity investments because initially no money changes hands. A guarantee commits the government to a payment if default occurs in the future. If the probability of default is zero, the guarantee is negligible to the government, and worthless to the recipient. However, if the probability of default is positive, the subsidy is proportional to the amount guaranteed and to the probability that default will make payment necessary. Evaluation of the subsidy component of a guarantee cannot be separated from the assessment of outcomes and probabilistics affecting the future of the recipient firm.

The fact that guarantees are affected by uncertain future events has led to a widespread belief that the subsidy implicit in a guarantee is not quantifiable. This is far from being the case. Rough magnitudes of the subsidy can be estimated subjectively. For example, a guarantee extended to a new, thinly capitalized venture such as the Bricklin Corporation is clearly worth more to the recipient than a guarantee for the same face

amount given to an established, strongly capitalized enterprise such as General Motors. The probability of default in the first case might be 50%; in the second the probability of default might be very small, say 1%. Assuming that the same amount was guaranteed in each case, the subsidy transmitted by the first obligation would be approximately fifty times the subsidy transmitted by the second. Rough estimates of relative magnitudes can be greatly refined by application of modern contingent claims analysis (CCA). Contingent claims analysis is based on the same principle as applies to the hypothetical Bricklin-GM comparison: the higher the probability of a payment on a guarantee, the higher the implicit subsidy. CCA extends this onsight to take account of the evolution of the enterprise and of the associated guarantee over time.

Financial interventions which represent potential subsidies are subject to misuse. The private sector may misuse financial subsidies by negotiating contracts which maximize the private value of the subsidy, regardless of public welfare. For example, if loan guarantees are used to encourage job creation, the private sector will seek to solicit guarantees for undercapitalized, risky ventures. These ventures are less likely to provide permanent employment benefits than stable, heavily capitalized enterprises, but will obtain more value from the guarantee. Misuse of indirect subsidies by the private sector can be redressed through increased awareness by public sector negotiatiors of how specific contracts induce adverse selection and poor management of projects. However, the potential for private misuse does not in itself make a budgetary control necessary.

Budgetary control is necessary because if cash and tax expenditures are strictly controlled and financial subsidies are not, then public agencies may use financial contacts to manage budgetary expenditures. Within the current government accounting system, financial contracts can be used to inflate or deflate reported budgetary expenditures. To accelerate expenditure (e.g. for the purpose of protecting a budget allocation), the agency can make loans or equity investments; as long as the capital is eventually repaid to the agency, these transactions have the effect of transferring an unused allocation from the present into the future. To defer expenditures, an agency can issue guarantees. Guarantees have no impact on current expenditures but do affect outstanding liabilities. They are a way for an agency to transfer budget resources from the future into the present. Using guarantees, an agency can increase the subsidies it gives today, without increasing its current budget allocation.

In order to exercise budgetary control over all financial subsidies, a unit of account must be identified. Requirements of the accounting unit are twofold: first it should measure only the subsidy component of any contract. It is important to measure the subsidy alone because the size of a financial transaction (e.g. the face amount of a loan or guarantee) may greatly overstate the actual magnitude of resources deployed. This in turn results in improper comparisons: for example, in the hypothetical Bricklin-GM comparison above, identical guarantees given to two different firms would lead to very different probable outlays in the future. To be effective, the budgetary unit of account must capture these differences.

A second requirement of the accounting unit is that it should permit comparisons across various types of subsidies: that is it should be possible to compare a loan or guarantee with a cash grant or a tax reduction. Comparability promotes consistency in the allocation of resources, and gives the public sector maximum flexibility in the design of appropriate interventions.

The cash grant-equivalent of an indirect financial subsidy is defined as the amount of cash which the recipient would willingly receive today in lieu of the financial contract. Within a highly developed capital market like Canada's, the grant-equivalent amount is equal to the capitalized value of the financial contract viewed as a claim by the private sector on the government. The identification of a grant-equivalent with the private value of a claim makes it possible to estimate grant-equivalents using modern financial valuation methods.

A cash grant-equivalent measures only the subsidy component of a transaction (the grant-equivalent of a non-subsidized transaction is zero) and because it is expressed as a present value, it can readily be compared with the present value of other subsidies such as cash grants and tax reductions.[5] Furthermore, use of the cash grant equivalent is fully consistent with optimal resource allocation and the methods of social cost-benefit analysis. In fact we show in the following section that, under

---

5 Present values are useful for economic cost-benefit analysis, but budgetary systems usually focus on the control of annual expenditures. Thus, to be useful in budgetary analysis, cash grant-equivalents may need to be converted into annualized costs which may be viewed as interest costs or insurance premiums.

weak restrictions on the public sectors activities, the calculation of grant-equivalents is essential to the design of appropriate public interventions in private sector decisions. The risk is not utilizing the grant-equivalent is that the private sector will be over-compensated for undertaking socially desirable actions.

4. ANALYSIS OF FINANCIAL SUBSIDIES FROM A PUBLIC PERSPECTIVE

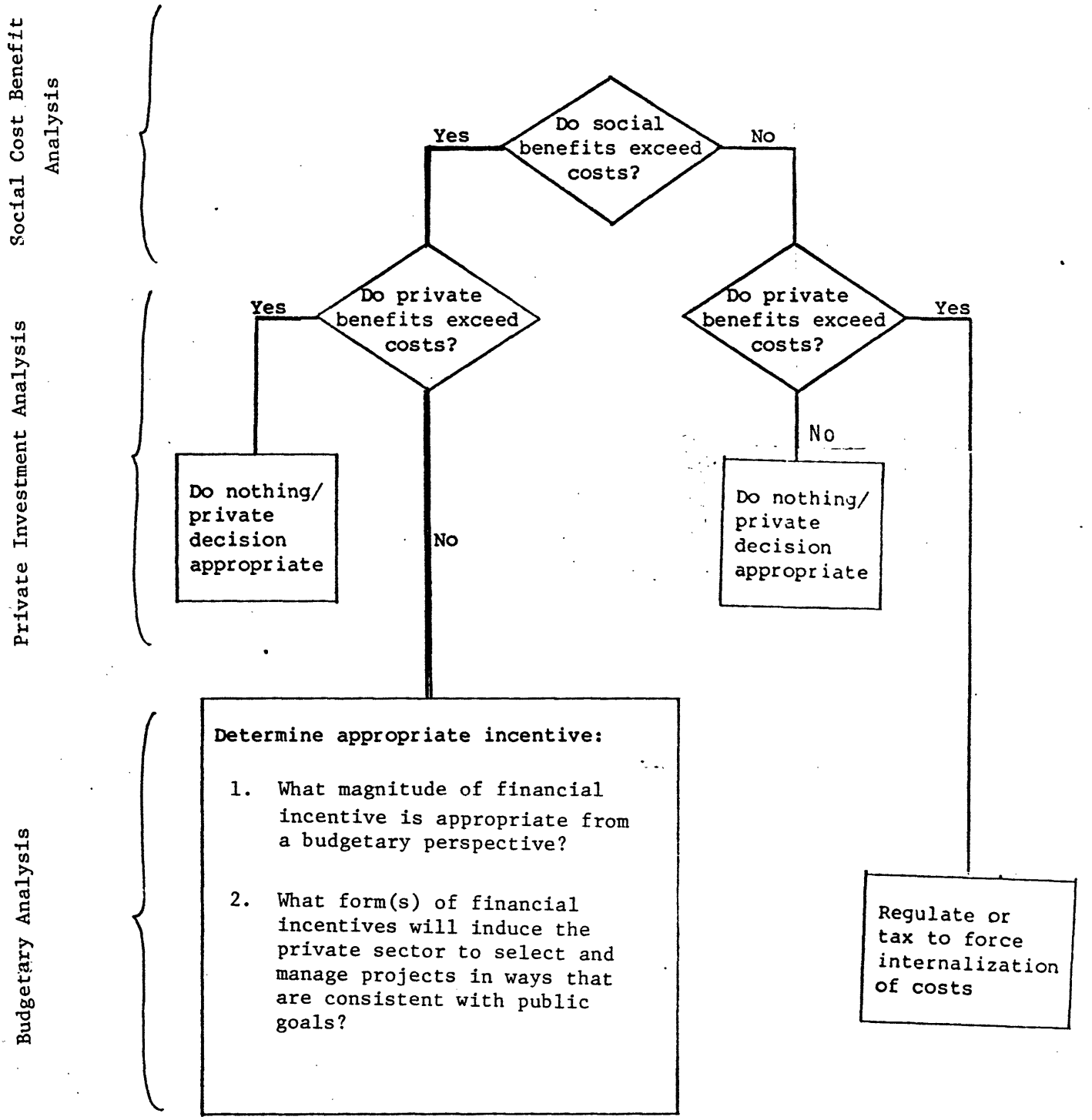
The decision to grant subsidies hinges on the answers to two related questions: does the project deserve support and does it require support? Social cost-benefit analysis determines whether it deserves support. Private investment analysis determines whether it requires support. When a project both deserves and requires support, the role of budgetary analysis is to ensure that the magnitude and type of the incentive is appropriate. These three related analyses are illustrated in Figure 1, with the heavy line illustrating the "critical path" for a project deserving and requiring public support. Each stage is discussed below.

Social Cost-Benefit Analysis

In evaluations of public projects, or of public support for private projects, the appropriate social perspective takes account of the project's impact on all sectors of society. In performing this analysis the costs and benefits of the project are measured in terms of real resource inflows and outflows, each priced at the relevant marginal social cost. Included in the benefits of the project are any public goods which it generates as well as the taxes it pays. However, public support is justified only if the private sector will not undertake the project without assistance. Thus a private evaluation must be undertaken.

Figure 1

Framework for Evaluating Financial Incentives



Private Valuation

The private valuation of a project takes into account only those costs and benefits which are borne by or are appropriated by the private enterprise involved. Thus, it is quite possible for a project to be socially beneficial and yet not be privately profitable, e.g., if it creates new permanent jobs. If a socially worthwhile project also passes the private-market test, i.e., has positive value, no public intervention should be necessary. On the other hand, if the project fails the private-market test, i.e., has negative value, public intervention is necessary to get the project funded. To reverse the private sector's decision, the project must get a subsidy greater than or equal to the private value shortfall. The private sector then considers the "base" project plus the subsidy as a new project which, by design passes the private value test.

In a well-functioning capital market the subsidy can be constructed in many different ways. It may be an immediate cash grant, a stream of deferred cash payments or future tax reductions, a concessionary loan, a guarantee, or a direct or equity investment. Whatever form the subsidy takes, the private capital markets will assign a value to the contract. The valuation will take account of the time pattern and risk characteristics of the cash flows, including any contingent claims built into the contract. This present value is the amount a private sector agent would willingly exchange for the subsidy. This is the amount we have defined as the subsidy cash grant-equivalent.

Once the present value is assessed, the subsidy can be "capitalized," that is, its cash flows can be sold, pledged as collateral, used as the

basis for a common stock issue or otherwise traded for current resources of equivalent value. With the capital markets as intermediary, even risky or contingent claims to public resources in the future can be exchanged for real resources today.

The capital market's efficiency in intermediating claims implies that an appropriate level of private investment can be induced through a variety of contractual mechanism with the same cash grant-equivalent value. The questions then remain:

1. What magnitude of financial incentive is appropriate from a budgetary perspective; and
2. What form(s) of financial incentives will induce the private sector to select and manage projects in ways that are consistent with public goals?

Budgetary Evaluation

In theory, the ability of society to subsidize worthwhile projects is unlimited. Viewed from the standpoint of social efficiency, subsidies are simply transfers from one group of citizens (taxpayers) to others (corporate shareholders, managers employees) that involves no resource cost to society as a whole. Of course if distribution effects are taken into account then transfers will be deemed to influence national welfare, but these effects are usually separated from efficiency considerations.

Nevertheless, we maintain that even when the analysis is restricted to consideration of efficiency, transfers do have a social resource cost. There are several reasons for this, First, part of a subsidy may flow to

foreigners who are not included within the social cost/benefit account. Second, if the government cannot appropriate the benefits arising from the transfer through the fiscal system, it will have to increase tax rates elsewhere in the economy. In so doing, it will "crowd out" certain projects which are socially profitable but which at a higher tax rate are no longer attractive from a private perspective. Third, voters may impose a constraint on total government expenditures including transfers in order to limit the size of government and ensure careful evaluation of government undertakings. In this case, the cost of the transfers will reflect the marginal social opportunity cost of government expenditures.

Because the secondary effects of transfers are not neutral, it is not in the public's interest to overcompensate private entities for undertaking socially desired actions. Therfore, subsidies to private enterprises should be designed to minimize the value of resources transferred relative to the benefits gained.

In this context, the budgetary process serves three purposes. First, it seeks to conserve public resources by requiring an evaluation of each major project or program to determine if it deserves support, requires support, and is not receiving excess support. Second, it provides overall constraints on current and future spending and thus plays an important role, along with tax policy and public debt management, in ensuring fiscal integrity over time. These two purposes are closely intertwined, of course, since the discipline imposed by the aggregate constraints forces tradeoffs among projects or programs and thus motivates more careful evaluation of individual projects. Finally, the budgetary process also seeks to ensure

that specific interventions are appropriate in terms of the managerial incentives they provide for project selection and management[6] and that they are efficient in terms of avoiding leakages[7] which cause the value of what is received to be less than the value of resources foregone by the rest of society.

From the private sector's decision rule it is evident that the grant equivalent value of the minimum sufficient subsidy is equal to the private value shortfall. Thus the grant-equivalent is a necessary and sufficient measure for determining the appropriate magnitude of a subsidy. However, through capital market intermediation, the minimum sufficient subsidy value can be translated into an infinite variety of subsidy contracts. These contracts may be vastly different in the time patterns and contingencies of the implied public commitments.

5. ESTIMATING CASH GRANT-EQUIVALENTS

The cash grant-equivalent of an indirect financial subsidy is the present value of the future transfers appropriately adjusted for risk. In most cases, the expected future transfers are readily defined, although in some cases they require considerable examination of the prospects of the firm itself (e.g., Bricklin vs. G.M.). The more complex aspect of calculating the cash grant equivalent, in general, is determining the appropriate adjustment for risk.

---

6 See Baldwin, Lessard, and Mason (1981) for an extensive discussion of the behavioral implications of various types of subsidies.

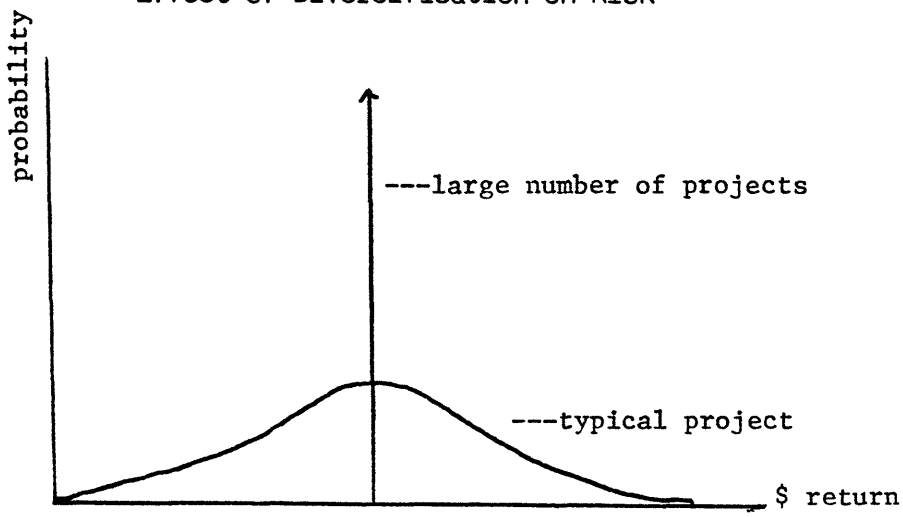
7 The most common example of leakages occurs when some portion of a subsidy is taxed away in another jurisdiction.

Figure 2 illustrates the methodology for evaluating grant-equivalents. First, the future cash transfers associated with each financial incentive must be identified. Second, given the characteristics of the cash flow in question, an appropriate valuation method must be selected. The method will depend on whether the future cash transfers are risky or riskless. For riskless transfers the appropriate discount rate depends on whether future cash flows are fixed in money terms or indexed to the price level. For risky transfers based on pro rata claims to a project's profits (e.g., tax rate reduction), the discount rate depends on the systematic risk inherent in the claim. Risky transfers of non-pro rata claims (e.g., loan guarantees) require Contingent Claims Analysis.

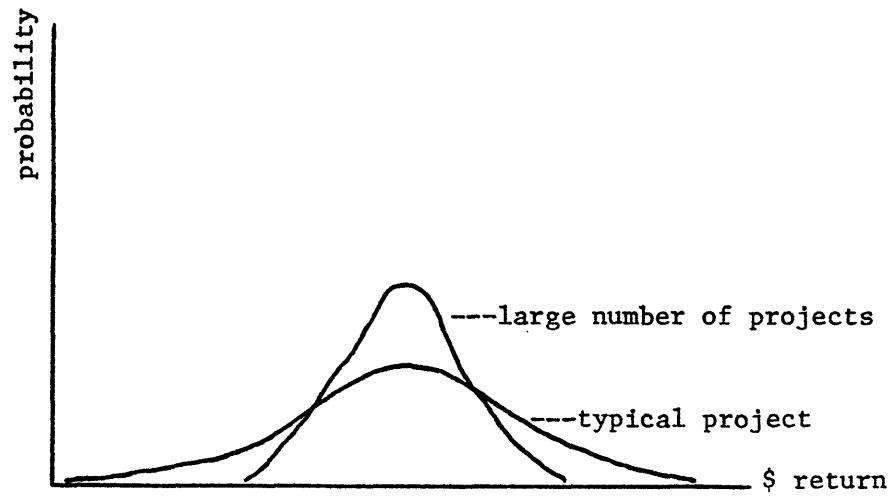
A loan guarantee is a non-proportional claim on the value of the underlying project or firm. It represents a promise to make up the difference between the value of the firm at the end of the period and the face value of the debt (see Figure 3). In principle, loan guarantees can be valued by discounting the expected payouts at an appropriate risk-adjusted discount rate. However, the appropriate risk premium is no longer proportional to the risk premium applicable to the underlying project. Further, the variability of the projects' value, which is a key determinant of the expected payment, depends upon the length of time for which the guarantee is extended. In fact, the valuation of loan guarantees and other non-proportional claims was a problem for which there was no exact solution for many years. However, Black and Scholes [1973] showed that nonproportional or contingent assets could be priced exactly through arbitrage. Specifically, they showed that a security and its underlying project are perfectly correlated over short intervals and thus arbitrage

Figure 2

Effect of Diversification on Risk



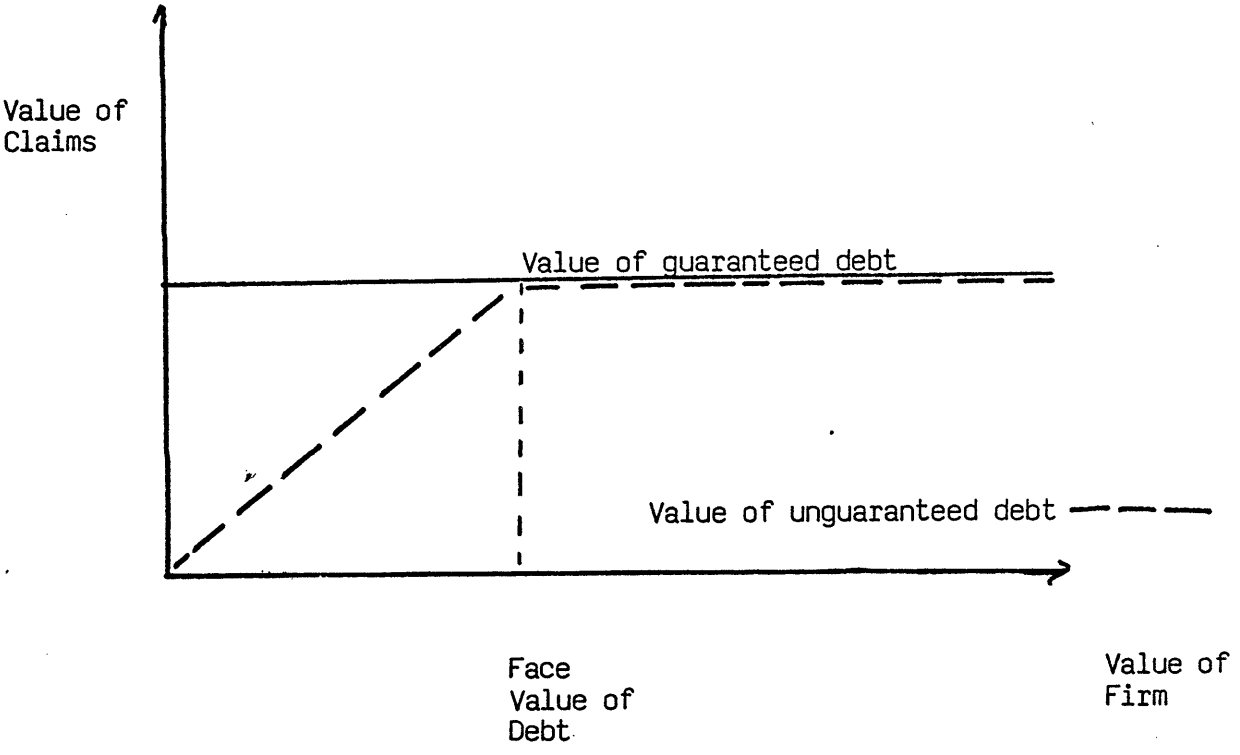
a. Independent Risks (technology, tastes, management, etc.)



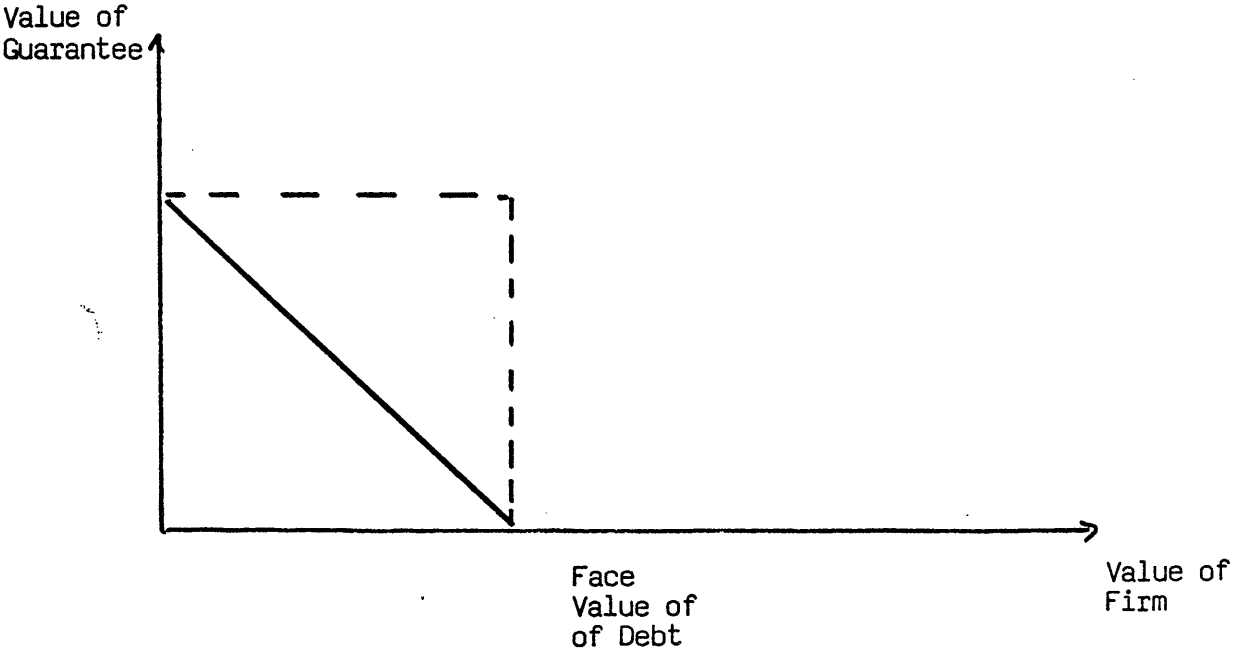
b. Dependent Risks (Demand, factor costs. etc.)

Figure 3

a. Value of Guaranteed versus Unguaranteed Debt Given Value of Underlying Firm.



b. Implied Value of Guarantee



conditions require that the ratio of expected excess return to the standard deviation of return - the reward to risk ratio - be identical for the security and the underlying project. The continuous application of this condition results in a valuation equation for the security which, in some cases, can be solved analytically and in all cases approximated numerically. The method is known as Contingent Claims Analysis (CCA).

We illustrate the results of CCA with two hypothetical situations using publicly available data for actual firms:

(1) a guarantee of a $200 million loan to International Harvester (IH)

(2) a guarentee of a $200 million loan to Dominion Textiles (DT).

This comparison is of interest since International Harvester is in financial difficulty, and hence a likely candidate for government assistance, while Dominion Textiles is a financially healthy company operating in a protected sector of the economy that has received significant government assistance.

The results of Contingent Claims Analysis are consistent with the intuitive notions that the value of a guarantee is dependent on the probability of default. The probability of default depends on the (1) business risk of the firm and (2) the financial risk of the firm. Business risk refers to the volatility of returns to the firm, e.g. the returns to oil exploration are more volatile than the returns to electric utilities. A firm with some degree of business risk can intensify its total variability by taking on financial risk as measured by the magnitude of its fixed financial commitments relative to the firm's value. The probability of default increases as the magnitude of fixed financial commitments becomes larger relative to the firm's value.

Table 2 sets forth the results of the Contingent Claims Analysis of hypothetical government guarantees of $200 million loans to both International Harvester and Dominion Textiles at the beginning of 1981. Business risk is estimated as the variance of the annual returns to the firms. Financial risk is measured as the magnitude of the current liabilities, long term obligations and total annual payouts, including interest payments, and dividends, relative to the firm's value. Since the equity of a levered firm can be viewed as a contingent claim, the value of the firm is estimated by inferring that value which is consistent with the observed market value of equity. As can be seen in Table 2, International Harvester has a higher estimated business risk than Dominion Textiles. Furthermore, even though International Harvester is a larger, i.e., more valuable, firm than Dominion Textiles, the magnitude of IH's financial obligations, relative to firm value, is much larger than Dominion Textile's. Therefore, it is not surprising to find that the greater business and financial risk of IH results in the more costly guarantee.

Table 2

Value of Government Loan Guarantees To
(All dollar figures in U.S. $ millions)

	International Harvester	Dominion Textile
Business Risk[8]	.16	.04
Financial Risk		
Current Liabilities	$2330	$178
Long Term Obligations	$1866	$220
Annual Payouts	$304	$41
Market Value of Equity	$247	$153
Value of Firm	$2618	$584
Value of Guarantee	$166	$10

[8] Business risk is measured as the annual standard duration of each firm's value estimated from stock market returns and adjusted for financial leverage.

Current Contingent Claims Analysis of a loan guarantee requires data concerning the riskiness of the firm and the relative magnitude of the firm's financial obligations. Although CCA involves relatively complex mathematics, the conclusions of the model correspond to common sense understanding of loan guarantees.[9] The riskier the business, the higher the probability of default and the more valuable the guarantee; and, the greater the financial obligations of the firm relative to its worth, the greater the probability of default and the higher the value of the guarantee.

6. ACCOUNTING FOR GUARANTEES: RECOMMENDATIONS

In previous sections we found that financial interventions are not consistently accounted for within the Canadian budget. Specifically, loan guarantees are not included in the current year's budget or in the "envelope" covering projected expenditures but are charged against the budget only when and if payment is required. Lastly, we showed that the subsidy component of a given financial intervention could be calculated by estimating the value of the subsidy in the private markets: this quantity we named the grant-equivalent of the intervention.

In this section we make specific recommendations as to how indirect financial subsidies should be accounted for in the government budgeting process.

---

9 See Jones and Mason [1980] for an extended discussion of the application of CCA to loan guarantees.

As we noted above, the purpose of the budget is twofold. First, it imposes a discipline which motivates careful evaluation of individual projects and programs and of the tradeoffs among them. Second, it limits total expenditures to a level consistent with tax and borrowing policy. In order to provide control at the micro and macro levels as well as information for planning at both levels, it is important that the budget process provide consistent measures of the costs of various programs as well as their impacts on overall expenditures in the present and future.

Our specific recommendations for extending the budget to include guarantees are described below. First, envelopes would be given budgetary allocations of guarantee grant-equivalents (CGE). In principle, the CGE's are dollar-for-dollar equivalent to cash expenditures. Realistically, the technicalities of cash expenditure accounting and the need to control Canada's overall exposure to contingent liabilities probably require separation of the cash and GGE allocations within each envelope.

Second, for a large, special-purpose guarantee, such as Massey-Ferguson, the guarantee's grant-equivalents would be calculated as part of the overall evaluation of the proposed government intervention. Before approval, the guarantee's grant-equivalent would be of use in negotiating the financial contract and in estimating the effects on Canada's exposure of changes in particular terms and covenants.

Third, assuming that the guarantee is approved by the envelope committee and is passed by parliament, the current year's envelope would be charged the grant-equivalent amount. Alternatively, as policy dictates, the guarantee grant-equivalent might be spread over the multi-year policy planning horizon.

We favor charging the envelope the cash equivalent of the guarantee rather than its face value for several reasons.[10] First, it is well-known that within any budgetary system, economic interventions with similar real impacts must be treated similarly: otherwise mistakes and misallocations are certain to occur. In an advanced economy such as Canada's, it is very likely that capital markets can transform any risky or contingent financial contract into its cash equivalent. Therefore, a given financial intervention will have the identical impact on real resource allocation and on the nation's fiscal position as a (net of tax) cash subsidy equal to the cash grant equivalent of the contracts. In this situation the only appropriate budgetary measure of a financial intervention is its cash grant-equivalent.

A guarantee granted to a risky venture has a high private value and hence a large impact relative to its face value on real resource allocations today. This is reflected in the high grant-equivalent on the guarantee. Conversely, a guarantee of a relatively safe venture (recall the GM example above) has a low private value and a relatively small impact on resource allocations, and this is reflected by its low grant-equivalent. Face-value budgeting for guarantees does not distinguish between guarantees of the same face amount but different risks. This is a serious drawback, since it causes the budgetary process to systematically favor risky guarantees with grant-equivalents close to their face amounts over safe guarantees with relatively low grant-equivalents.

---

10 The U.S. currently records the face value of all guarantees in the Federal Credit Budget. No attempt is made, however, to compute the corresponding cash grant-equivalent. See United States Congress [1982].

Grant-equivalent budgeting for guarantees is preferable to face-value budgeting because it more correctly reflects the real impact of the government intervention and the underlying risk of the guarantee. In Section 4 we argued that grant-equivalents of guarantees can be estimated using contingent-claims analysis. For large, risky guarantees such as Massey Ferguson, the incremental analysis required to estimate the guarantee's grant-equivalent is small. Guarantees of this type should be subject to budgetary controls based on grant-equivalent principles. Ongoing programs which grant large numbers of small guarantees can continue to be controlled by budgeting for average losses.

Finally, the grant-equivalent charge against the envelope would function as an insurance premium. That is, except for a "deductible" amount, which might remain a contingent liability of the envelope, the envelope in subsequent years would be insulated from major shocks of defaults on large guarantees. Instead, guarantee contingent liabilities would be managed on a pooled basis and payments on defaults charged against appropriate central reserve accounts.

There are a number of reasons to lump large guarantees into an aggregate pool. First, although large guarantees to enterprises within the same economy are not independent risks, some offsetting of risk is to be expected, thus payments on an aggregate pool would vary less over time than payments on the individual guarantees separately. Second, grant-equivalents can be calculated on each transaction separately and represent the necessary payment to fund a reserve account with zero average balance. However, because risks on individual guarantees are not independent, some portion of the aggregate risk

is irreducible. In order to control the irreducible risk, contingent liabilities must be monitored on an aggregate basis. Thus, for the purpose of assessing Canada's short- and long-term contingent liability, guarantees must be evaluated in relation to each other. Probabilities of contingent payments conditional on other events must be assessed in order to estimate and plan for Canada's overall exposure.[11]

Rather than actually setting up reserves, we expect that the government would limit its total borrowing relative to some authorized maximum amount in order to provide a borrowing cushion for meeting guarantee obligations. The total "reserve," then, would represent the borrowing margin and would be based on an estimate of potential aggregate guarantee expenditures over time.

---

11 In practice, the monitoring would take the form of periodic updating of estimates of the sensitivity of specific guarantee obligations to a set of common underlying factors such as overall Canadian economic activity, unemployment, energy prices, nominal interest rates, farm prices, etc. For an illustration of a similar portfolio analysis of risky loans, see Feiger and Jacquillat (1982), ch. 11.

REFERENCES

Baldwin, C.Y., D.R. Lessard, and S.P. Mason, [1981], "Evaluation of Financial Incentives to Create Employment", Technical Report No. 20, Labour Market Development Task Force, Canada Commission on Employment and Migration, Ottawa.

Black, F. and M. Scholes, [1973], "The Pricing of Options and Corporate "Liabilities," Journal of Political Economy 81: pp. 637-659

Brealey, R. and S. Myers, [1981], Principles of Corporate Finance, McGraw-Hill Book Co., New York.

Burgess, D., [1980], "The Social Discount Rate for Canada: Theory and Measurement", Economic Policy Analysis Sector, Energy, Mines and Resources Canada, Ottawa.

Canada, Treasury Board, [1980], Guide to the Policy and Expenditure Management System, Ottawa.

Canada, Department of Finance, [1981], The Budget in More Detail, Tabled in the House of Commons by the Honourable Allan J. MacEachen, Deputy Prime Minister and Minister of Finance, Ottawa.

Fama, E., [1976], Foundations of Finance, Basic Books, Inc., New York.

Feiger, G. and B. Jacquillat, [1981], International Finance, Allyn and Bacon. Boston.

Harberger, A.C., [1972], Project Evaluation, University of Chicago Press, Chigago.

Ibbotson, R.G. and R.A. Sinquefield, [1977], Stocks, Bonds, Bills and Inflation: The Past (1926-1970) and the Future (1977-2000). Financial Analysts Research Foundation, Charlottesville, Va.

Jenkins, G.P., [1977], "Capital in Canada: Its Social and Private Performance 1965-1974", Discussion Paper No. 98, Economic Council of Canada, Ottawa.

Jones, E.P. and S.P. Mason, [1980]. "Valuation of Loan Guarantees", Journal of Banking and Finance 4: pp. 89-107.

Pogue, G.A., [1981], "Determination of the Cost of Capital and Capital Structures for Utilities which are Subsidiaries of Diversified Companies", Working Paper, Baruch College, CUNY.

Sjastaad, L.A. and D.L. Wisecarver, [1977], "The Social Cost of Public Finance", Journal of Political Economy 85: pp. 513-548.

United States Congress, Congressional Budget Office [1982]. "Federal Credit Activities: An Overview of the President's Credit Budget for Fiscal Year 1983. Staff Working Paper, March.